

REMARKS

Claims 1 and 2 are amended by this response and claims 3 through 5 are canceled by this response. Support for these amendments are as follows: Claim 1 (Claim 3, p. 8, l. 8-13, Claim 4, p. 9, l. 25-28, Tables 1-7, Example 19, p. 5, l. 23- p. 6, l.3, p. 12, l. 20-p. 13, l. 13); Claim 2 (p. 8, l. 8-13). No new matter is added by this response.

The specification is amended by this response. The support for these amendments are from p. 12, l. 20 – p. 13, l. 3.

Claims 1, 2 and 4-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakano et al. (U.S. Patent 4,876,324). (Office Action p. 2)

Nakano et al. discloses a process for production of novolak resin by reacting an ortho cresol and an aldehyde in the presence of an acid catalyst. However, Nakano et al. only discloses the general reaction which switches from a homogeneous reaction to a heterogeneous reaction formed between solid and liquid starting from an emulsification. This is evidenced from the fact that Nakano et al. only mentions “polycondensing ortho cresol... with an aldehyde compound... in a solvent.” (Nakano et al., Claim 1) This is also evidenced from the amount of an acid catalyst of Nakano et al. “0.01 to 20% parts by weight per 100 parts by weight of the above-mentioned cresol component” being less than the claimed invention. (Nakano et al., col. 5, l. 62-65) Also, column 6, lines 28-33, state that the “high weight novolac resins are... at last to form a heterogeneous reaction system, and thus the formation of high molecular weight resins is extremely difficult.” This is in contrast to the claimed invention.

The claimed invention prepares a novolak resin by reacting a phenol and an aldehyde in the presence of an acid catalyst. (Specification, p. 5, l. 23-26) The reaction mixture becomes opaque (emulsifies) midway through the reaction and the reaction mixture is separated into a resin layer and an aqueous layer. (Specification, p. 5, l. 23-p. 6, l. 14) The claimed invention makes a heterogeneous reaction in a cloudy state in which the organic phase has phenol as the main ingredient and the water phase has phosphoric acid, aldehyde, and a reaction cosolvent as the main ingredients. (Specification, p. 12, l. 20-24)

[T]he phenol in the organic phase dissolves into the water phase by the dissolution promoting action of the reaction cosolvent and reacts with the aldehyde under the catalyzing conditions of the phosphoric acid to grow as a condensate (resin), which cannot coexist in the water phase and moves to the organic phase having the condensate dissolving power, and the further growth of the condensate is suppressed or stopped, so that it is prevented from being of high molecular weight. Thus, the process of the invention applies a two-liquid phase interface reaction having a mechanism of suppressing the resinification of the phenol in the water phase and the resin from being of high molecular weight in the organic phase, so that it is assumed that the resin having the contents of the monomeric phenol and dimeric phenol and a degree of dispersion (Mw/Mn) controlled is produced at the end of the condensation reaction, and the yield is considerably improved. (Specification p. 12, l. 24- p. 13, 13)

The organic and water phases are mixed by using 25 parts by mass or more of a phosphoric acid per 100 parts by mass of a phenol as an acid catalyst and 5-100 parts by mass of an unreactive oxygen-containing organic solvent which has a good affinity with phosphoric acid per 100 parts by mass of the phenol as a reaction cosolvent. (Specification, p. 8, l. 8-13, p. 9, l. 25-28, Tables 1-7) In other words, the claimed invention conducts a heterogeneous reaction between a liquid and a liquid. The claimed invention is capable of preparing novolak resin in good yield and with the ability to control the contents of the monomeric phenol and dimeric phenol and the degree of dispersion (Mw/Mn). This is unlike the heterogeneous reaction of Nakano et al. which is between a solid and a liquid.

Nankano et al. does not teach or disclose the amounts of the phosphoric acid or reaction cosolvent in relation to the phenol in the process of the claimed invention. Because Nankano et al. does not disclose the elements of the claimed invention it does not anticipate the claimed invention. For the forgoing reasons, withdrawal of the rejection under 35 U.S.C. § 102(b) is respectfully requested.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano et al. as applied to claim 1 above. (Office Action p. 3)

As discussed above, Nakano et al. does not teach or disclose the claimed process of the claimed invention. The claimed invention discloses a process in which a heterogeneous reaction is conducted between a liquid and a liquid. In contrast, Nakano et al. discloses a process in which the heterogeneous reaction is conducted between a solid and a liquid. Nakano et al. does not teach or disclose the amounts of the phosphoric acid or reaction cosolvent in relation to the phenol in the process of the claimed invention. For the forgoing reasons, withdrawal of the rejection under 35 U.S.C. § 103(a) is respectfully requested.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano et al. as applied to claim 1 above, and further in view of Helbing (WO 99/60043). (Office Action p. 3)

Nakano et al. fails to teach or disclose the elements of the claimed invention. Nakano et al. fails to teach or disclose the amounts of the phosphoric acid or reaction cosolvent in relation to the phenol in the process of the claimed invention.

The Office Action acknowledges that Nakano et al. does not teach adding a surface active agent to the reaction. Helbing is cited to compensate for this deficiency. (Office Action p. 3) However, the composition of Helbing is a resin binder composition containing about 10%-40% solids. (Helbing, p. 4, l. 6-9) This is in contrast to the process of the claimed invention in which a heterogeneous reaction between a liquid and a liquid.

Further, Helbing does not disclose the claimed amounts of the phosphoric acid or reaction cosolvent in relation to the phenol in the process of the claimed invention as in amended claims 1 and 2.

The references, alone or in combination, do not teach or disclose the elements of the claimed invention, namely, the amounts of the phosphoric acid or reaction cosolvent in relation to the phenol in the process of the claimed invention. Therefore, the claimed invention cannot

be obvious in view of the Nakano et al and Helbing. The Applicants respectfully request the rejection under 35 U.S.C. 103(a) be withdrawn.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nakano et al. as applied to claim 1 above and further in view of Saito et al. (U.S. publication 2002/0091224). (Office Action p. 4)

The Office Action acknowledges that Nakano et al. does not teach the reaction being performed at pressure. Saito et al. is cited to compensate for this deficiency. (Office Action p. 4) However, the composition of Saito et al. is also a reaction between a liquid and a solid. (Saito et al., Examples 1-11 use ortho-cresol) Paragraph 23 states that "an organic solvent can also be used if necessary[,] as the solvent, those which dissolve raw materials and the product are preferable.." (Saito et al., paragraph 23) This is in contrast to the process of the claimed invention in which a heterogeneous reaction between a liquid and a liquid.

Further, Saito et al. does not disclose the claimed amounts of the phosphoric acid or reaction cosolvent in relation to the phenol in the process of the claimed invention as in amended claims 1 and 2.

The references, alone or in combination, do not teach or disclose the elements of the claimed invention. In particular, the references, alone or in combination, do not teach or disclose the amounts of the phosphoric acid or reaction cosolvent in relation to the phenol in the process of the claimed invention. Therefore, the claimed invention cannot be obvious in view of the Nakano et al and Saito et al. The Applicants respectfully request the rejection under 35 U.S.C. 103(a) be withdrawn.

Claims 1-7 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 7,241,833 in view of Nakano et al. (US Pat. 4,876,324).

Claim 8 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 7,241,833 in view of Nakano et al. (US Pat. 4,876,324) and further in view of Helbing (WO 99/60043).

Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 7,241,833 in view of Nakano et al. (US Pat. 4,876,324) and further in view of Saito et al. (US 2002/0091224).

A Terminal Disclaimer is being filed here with to obviate USP 7,241,833 and overcome all three rejections above.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

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Respectfully submitted,

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